

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 38

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DAVID M. ERDMAN, DALE F. YODER,
RICHARD S. TATMAN, and DAVID T. MOLNAR

Appeal No. 1998-3072
Application No. 08/769,610

HEARD: February 6, 2001

Before HAIRSTON, FLEMING, and BARRY, Administrative Patent Judges.

BARRY, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the rejection of claims 1-5, 7-14, 23-25, 33, 34, 75, and 76. We reverse.

BACKGROUND

The invention at issue in this appeal relates to an integral low power, high efficiency electronically commutated

motor and associated control. Such a motor would be useful, for example, in a household refrigerator.

The invention uses an output from a Hall sensor to trigger sequential energization of a pair of stator windings through switches. The sequential energization creates a rotating magnetic field that reacts with the permanent magnetic field of a rotor, causing the rotor's shaft to rotate. Although the magnetic flux created by an energized winding is proportional to current flow through the winding, maximum torque, and hence maximum power output, is not continuously produced during continuous maximum current flow through the windings during operation of the motor. To the contrary, changes in magnetic flux coupling result in decreased motor torque during a portion of rotor rotation notwithstanding the continuous application of full power to the stator windings.

Figure 23 of the appellants' specification depicts the phenomenon. The Figure plots current flow (proportional to magnetic flux) through the windings against time and torque or

power output against time. A current curve (1100) depicts current flow as a square wave; a power curve (1101) represents applied or input power. The torque produced and, as such, the output power, falls off at the end of each cycle of input current or power as shown in a period (1103) of curve (1101). The reduced motor power output during the period (1103) results from the variations in the magnetic coupling between the rotor and stator windings, and the duration of such periods is about twenty to thirty percent of the total power input time represented by the current curve (1100). A power savings is possible with little sacrifice in output performance by switching off the input power during these low torque-to-current periods (1103).

Figures 22B and 22C diagram the inventive circuitry for calculating a correct turnoff signal over a wide range of motor speeds. The turnoff signal controls energization of the motor windings as a function of relative rotor position, notwithstanding that the Hall sensor may indicate that continuous power should be applied to the windings.

Claim 1, which is representative for our purposes,
follows:

1. A high-efficiency low-power integrated and unitary fan motor and control assembly suitable for use in refrigeration systems comprising an electronically commutated DC motor, a control and power circuit, and a substrate carrying a plurality of electronic components and interconnections of such circuit;

said electronically commutated motor including a stator core, a permanent magnet rotor, and at least one winding inductively coupled with said stator core;

a Hall sensor mounted on said substrate and forming part of said circuit, and positioned in magnetic coupling relationship with said permanent magnet rotor to sense rotation of said rotor;

said circuit including at least one DC power supply, and switching means to provide power to said at least one winding during a cycle of applied power defined by signals from said Hall device; and

said control circuit determining periods of reduced magnetic coupling between the rotor and stator during the cycle of applied power and inhibiting the supply of power to said at least one winding during the determined periods of reduced magnetic coupling, thereby to decrease the total amount of power supplied to the at least one winding and to increase the efficiency of the motor and control.

The references relied on in rejecting the claims follow:

Uchiyama et al. (Uchiyama) 1981	4,259,603	Mar. 31,
Grouse 1986	4,618,806	Oct. 21,
Plunkett 1990	4,928,043	May 22,
Ohi 1992.	5,162,709	Nov. 10,

Claims 1, 23-25, and 75 stand rejected under 35 U.S.C. § 103 as obvious over Ohi in view of Plunkett and Uchiyama. Claims 2-5, 7-14, and 76 stand rejected under § 103 as obvious over Ohi in view of Plunkett and Uchiyama further in view of Grouse. Rather than repeat the arguments of the appellants or examiner in toto,

we refer the reader to the briefs and answer for the respective details thereof.

OPINION

In deciding this appeal, we considered the subject matter on appeal and the rejection advanced by the examiner. Furthermore, we duly considered the arguments and evidence of the appellants and examiner. After considering the record, we

are persuaded that the examiner erred in rejecting claims 1-5, 7-14, 23-25, 33, 34, 75, and 76. Accordingly, we reverse.

We begin by noting the following principles from In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993).

In rejecting claims under 35 U.S.C. Section 103, the examiner bears the initial burden of presenting a prima facie case of obviousness. In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).... "A prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." In re Bell, 991 F.2d 781, 782, 26 USPQ2d 1529, 1531 (Fed. Cir. 1993) (quoting In re Rinehart, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976)).

With these principles in mind, we consider the appellants' argument and the examiner's reply.

The appellants argue, "none of the cited references-- singly or in combination--teach or suggest determining periods of lower rotational torque, reduced magnetic coupling, or reduced operating efficiency." (Reply Br. at 2.) The examiner replies, "figures 3a-3c, 10a-10i of Ohi and figure 5,

illustrate these sections within the pulses. The commutation of the motor coils is further controlled at these points by reducing the current as is common within motor commutation. Figure 6 within Plunkett illustrates the actual pulse shapes within the coils" (Examiner's Answer at 8.) He adds, "[t]he hall effect detectors within Ohi and Plunkett clearly operate the commutation based on these 'detected' pulses within the motor coils." (Id. at 8.)

Claims 1-5, 7-14, and 76 specify in pertinent part the following limitations: "said control circuit determining periods of reduced magnetic coupling between the rotor and stator during the cycle of applied power and inhibiting the supply of power to said at least one winding during the determined periods of reduced magnetic coupling" Similarly, claims 23-25, 33, and 34 specify in pertinent part the following limitations: "the control circuit to determine periods of lower rotational torque during the cycle of applied power ... and for inhibiting the supply of power to the at least one winding during the determined periods of lower rotational torque" Similarly, claim 75 specifies in

pertinent part the following limitations: "determining periods of reduced operating efficiency during each cycle of applied power ... and inhibiting the application of power to all of the winding means during at least part of that segment of each cycle of applied power when reduced operating efficiency would otherwise result" Accordingly, claims 1-5, 7-14, 23-25, 33, 34, 75, and 76 require determining periods of reduced magnetic coupling, rotational torque, or operating efficiency, and inhibiting power to a winding during the determined periods.

The examiner fails to show a suggestion of the limitations in the prior art. "Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor." Para-Ordnance Mfg. v. SGS Importers Int'l, 73 F.3d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995), cert. denied, 519 U.S. 822 (1996)(citing W.L. Gore & Assocs., Inc. v. Garlock, Inc., 721 F.2d 1540, 1551, 1553, 220 USPQ 303, 311, 312-13 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984)). "It is impermissible to use the claimed invention as an instruction manual or 'template' to

piece together the teachings of the prior art so that the claimed invention is rendered obvious."

In re Fritch, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992) (citing In re Gorman, 933 F.2d 982, 987, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991)). "The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." Id. at 1266, 23 USPQ2d at 1784 (citing In re Gordon, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984)).

Here, the examiner does not establish that Figures 3(a)-(c), 5, or 10(a)-(i) of Ohi or Figure 6 of Plunkett shows periods of reduced magnetic coupling, rotational torque, or operating efficiency, let alone determining such periods and inhibiting power to a winding during the determined periods. He fails to allege, let alone show, that the addition of Uchiyama or Grouse cures the deficiency of Ohi and Plunkett.

Because neither Ohi nor Plunkett teaches determining periods of reduced magnetic coupling, rotational torque, or

operating efficiency, and inhibiting power to a winding during the determined periods, we are not persuaded that teachings from the applied prior art would appear to have suggested the claimed limitations of "said control circuit determining periods of reduced magnetic coupling between the rotor and stator during the cycle of applied power and inhibiting the supply of power to said at least one winding during the determined periods of reduced magnetic coupling"; "the control circuit to determine periods of lower rotational torque during the cycle of applied power ... and for inhibiting the supply of power to the at least one winding during the determined periods of lower rotational torque"; or "determining periods of reduced operating efficiency during each cycle of applied power ... and inhibiting the application of power to all of the winding means during at least part of that segment of each cycle of applied power when reduced operating efficiency would otherwise result" The examiner fails to establish a prima facie case of obviousness. Therefore, we reverse the rejection of claims 1, 23-25, and 75 under 35 U.S.C. § 103 as obvious over Ohi in view of Plunkett and Uchiyama and of claims 2-5, 7-14, and 76 under § 103 as

obvious over Ohi in view of Plunkett and Uchiyama further in
view of Grouse.

CONCLUSION

In summary, the rejections of claims 1-5, 7-14, 23-25,
33, 34, 75, and 76 under 35 U.S.C. § 103 are reversed.

REVERSED

KENNETH W. HAIRSTON)	
Administrative Patent Judge)	
)	
)	
)	
)	BOARD OF PATENT
MICHAEL R. FLEMING)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES
)	
)	
)	
LANCE LEONARD BARRY)	
Administrative Patent Judge)	

Appeal No. 1998-3072
Application No. 08/769,610

Page 12

LLB/kis
DAMIAN WASSERBAUER, ESQ.
COUNSEL, INTELLECTUAL PROPERTY
GENERAL ELECTRIC COMPANY
41 WOODFORD AVENUE
PLAINVILLE, CT 06062